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April 19, 2000

Box PATENT APPLICATION
Assistant Commissioner for Patents
Washington, D.C. 20231

Re: New U.S. Patent Appln.
Our Ref: 3064NG/48834

Sir:

Transmitted herewith for filing is the patent application of:

Koukichi MASUMOTO

entitled: **FIXING HOLDER FOR FIXING ELECTRONIC COMPONENT HAVING WIRE-SHAPED LEG PORTIONS TO PRINTED CIRCUIT BOARD, AND FIXING METHOD UTILIZING THE SAME**

Enclosed are:

1. Specification, including 7 claims (12 pages).

2. 3 Sheets of _____ Formal X Informal drawings showing Figs. 1a-1b, 2a-2b and 3a-3c.

3. X Declaration and Power of Attorney **(executed)**.

4. Assignment of the invention to Funai Electric Co., Ltd.

5. Certified copy of Priority Document 11-111877 filed in Japan on April 20, 1999, the priority of which is being claimed under 35 U.S.C. §119 and 37 C.F.R. §1.55.

6. The filing fee has been calculated as shown below:

Basic Fee					$345/690 =	$690.00
Total Claims	7 - 20 =	0	x		$ 9/18 =	$
Independent Claims	2 - 3 =	0	x		$39/78 =	$
Multiple Dependent Claim Presented					$130/260 =	$
Total Filing Fee						$690.00

Two checks in the amount of $690.00 for the filing fee and $40.00 for the assignment recording fee are enclosed. The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment, to Deposit Account No. 05-1323 (Docket #3064NG/48834). A duplicate copy of this sheet is enclosed.

Respectfully submitted,

Jeffrey D. Sanok
Reg. No. 32,169

JDS:ps

FIXING HOLDER FOR FIXING ELECTRONIC COMPONENT HAVING WIRE-SHAPED LEG PORTIONS TO PRINTED CIRCUIT BOARD, AND FIXING METHOD UTILIZING THE SAME

BACKGROUND OF THE INVENTION

The present invention relates to a fixing holder for fixing an electronic component having wire-shaped leg portions such as an LED (light emitting diode) to a printed circuit board (hereinafter abbreviated as a PCB), and a fixing method utilizing the same.

A PCB is installed in a dipping machine in a state that a multiplicity of electronic components are mounted on the upper portion of the PCB, so that the lower surface thereof soldered.

In general, the dipping machine includes guide rails G having U-shaped configuration in its section for guiding right and left edges of the PCB as shown in Fig. 1A. The PCB is guided by the guide rails G so as to move therealong and passes through a soldering bath provided on a way of the running path, thereby being subjected to the soldering on its lower surface.

Due to the aforesaid configuration of the dipping machine, an electronic component can not be fixed at the left or right edge of the PCB so as to extend across the edge portion transversely.

In other words, such a component which interferes the passing of the guide rails can not be fixed at the edge portion of the PCB where the guide rail G passes.

In a case where electronic components such as an LED are

required to be fixed at the edge portion of such a PCB by all means due to the requirement for the circuit design, only such components are soldered and fixed manually without using the dipping machine.

That is, components other than such particular components are soldered and fixed on the PCB by using the dipping machine and only the particular components are soldered and fixed manually.

The Japanese Utility Model Application Publication No. Hei 3-113900 discloses an LED holder. As shown in Fig. 3, such an LED holder is arranged in a manner that first elastic engagement pieces 101d, 102e for provisional fixing are protrusively provided at the lower end thereof, second elastic engagement pieces 101f, 101g for formal fixing are protrusively provided at the one side thereof, and a thin bending portion 101a is provided between the first elastic engagement pieces and the second elastic engagement pieces, whereby after the holder is provisionally fixed on a substrate 103, the holder is bent and fixed at a predetermined position of the substrate.

However, when the LED holder 101 is bent at the bending portion 101a, tension force is applied at leg portions 102a, 102b of the LED 102. Thus, there arises a problem that the dipped or soldered portions at the tip ends of the leg portions 102a, 102b may come off or the leg portions 102a, 102b may be broken at portions thereof.

Further, according to such a holder, the LED 102 can not protrude to the side direction at the near portion of the edge

of the PCB, and the LED is fixed at the portion lifted from the PCB 103 by the length l of the elastic engagement pieces 101f, 101g. Thus, the holder is insufficient for the degree of freedom in its design.

SUMMARY OF THE INVENTION

Accordingly, an object of the present invention is to provide a holder which can install a PCB in a dipping machine by using the holder even in a case where an electronic component such as an LED must be fixed at the edge of the PCB so that the electronic component can be fixed on the PCB with minimum manual processing.

Further, another object of the present invention is to provide a method for fixing an electronic component having wire-shaped leg portions to a PCB with a fixing holder, the fixing holder being an almost cylindrical-shaped holder for holding the electronic component having the wire-shaped leg portions in a manner that the leg portions pass through and protrude therefrom, the method comprising the steps of: providing a fixing holder on the PCB; holding a main body portion of the electronic component by a holder main body portion of the fixing holder; laying down the holder main body portion towards an opened surface of a base portion thereof; and engaging an engagement nail portion formed on the main body portion of the fixing holder with the PCB.

BRIEF DESCRIPTION OF THE DRAWINGS

Figs. 1A and 1B show an LED holder according to an embodiment

of the present invention, wherein Fig. 1A is an exploded perspective view of the LED holder showing a case where the LED holder is attached to a PCB in an erected state before dipping the PCB, and Fig. 1B is a perspective view showing a state where the LED holder is inclined and laid on the PCB and fixed thereon after dipping the PCB.

Figs. 2A and 2B show sectional views of the LED holders showing the states of Figs. 1A and 1B, respectively.

Figs. 3A to 3C show a conventional LED holder, wherein Fig. 3A is a perspective view showing a state where the holder has not been attached yet, Fig. 3B is a cross sectional view showing a state where the holder is provisionally attached ,and Fig. 3C is a perspective view showing a state where the holder has not been attached.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

An LED holder according to the embodiment of the present invention will be explained with reference to the accompanying drawings.

Figs. 1A and 1B show the LED holder according to the embodiment of the invention, wherein Fig. 1A is an exploded perspective view of the LED holder showing a case where the LED holder is attached to a PCB in an erected state before dipping the PCB, and Fig. 1B is a perspective view showing a state where the LED holder is inclined and laid on the PCB and fixed thereon after dipping the PCB. Figs. 2A and 2B show sectional views of

the LED holders showing the states of Figs. 1A and 1B, respectively.

As shown in Figs. 1A and 2A, the LED holder of the embodiment is arranged in a manner that the front surface 22 of a base portion 2A is formed as a flat surface, the front surface 22 is provided at the end portions thereof on the PCB 3 side with slanted surfaces 23, 23 cut obliquely, and an opening 24 is formed at the front surface 22.

The main body portion 2B continuously provided at the base portion 2A is provided at the front surface side of the almost center portion thereof with engagement projection portions 26, 26 having engagement nail portions 25, 25 which are inserted into and engaged with engagement holes 31, 32 provided at predetermined portions of the PCB 3, respectively.

After an LED 4 is inserted into the LED holder 1 configured in this manner, the entirety of the PCB 3 is installed in the dipping machine in a state that the base portion 2A and the main body portion 2B are erected on the PCB 3 as shown in Fig. 1A. Thereafter, the LED holder is attached to the PCB 3 in the following manner as shown in Figs. 1B and 2B. That is, the main body portion 2B is inclined forward and laid down on the PCB in a manner that the slanted surfaces 23, 23 of the front surface 22 of the base portion 2A are inclined and laid along the upper surface of the PCB 3 thereby to contact the front surface 22 formed by the flat surface to the upper surface. Further, the engagement projection portions 26, 26 are inserted into and engaged with the engagement

holes 31, 32 of the PCB 3 so that the engagement nail portions 25, 25 prevent the engagement projection portions from coming out of the engagement holes, respectively, whereby both the tip portion 27 of the main body portion 2B and the LED 4 protruding from the tip portion 27 protrude from the edge of the PCB 3.

In the drawings, a reference numeral 4a depicts a wire-shaped leg portion of the LED, and 34 a hole formed in the PCB 3 through which the leg portion 4a is inserted.

Thus, in the case of installing the LED holder in the dipping machine, the LED holder 1 can be approached to the guide rails G in such a state that the holder is erected on the PCB 3. Thus, the LED 4 or the holder 1 can be prevented from striking with the guide rails G of the dipping machine. Further, after passing through the dipping machine, an operator can lay down the LED holder 1 sidewise thereby to protrude the LED 4 or the tip portion 27 of the holder 1 from the edge of the PCB 3.

Accordingly, it is possible to eliminate a process of manually soldering the LED 4 and so the number of the processes can be reduced.

Further, since the holder is configured in a manner that the slanted surfaces 23, 23 cut obliquely are formed at the PCB 3 side end portions of the front surface 22 of the base portion 2A so that the holder is inclined and laid down along the slanted surfaces 23, 23 when being inclined and laid down, the holder can be inclined and laid down smoothly.

Further, since the base portion 2A is provided at the front

surface thereof with the opening 24, the leg portions 4a, 4a of the LED 4 can freely move within the opening 24 when the holder is inclined and laid down, so that it is possible to prevent the leg portions 4a, 4a of the LED 4 from being folded or cut.

In the drawings, a symbol S depicts a soldered portion soldered by the dipping machine and a reference numeral 40 depicts a rib formed within the main body portion 2B for pivotally supporting the head portion (light emitting portion) of the LED.

Regarding the holder, the material of the holder is selected from ABS, or PS, the diameter is 3.5 mm, the height is 20 to 25 mm.

In the above embodiment, the holder holds one LED. However, it is possible to hold twin LEDs.

WHAT IS CLAIMED IS:

1. A fixing holder for fixing an electronic component having wire-shaped leg portions to a printed circuit board,

said holder being an almost cylindrical-shaped holder for holding the electronic component having the wire-shaped leg portions in a manner that the leg portions pass through and protrude therefrom,

said fixing holder comprising:

a holder main body portion for holding a main body portion of the electronic component; and

a base portion continuously provided to said holder main body portion, wherein

one surface of said base portion on a forward side is opened to form an opening,

at least a portion of periphery of the opening is configured to form a flat surface, and

a side surface of said holder main body portion on a side where the opening is formed is protruded forward to form an engagement nail portion to be engaged with the printed circuit board.

2. The fixing holder for fixing the electronic component having the wire-shaped leg portions to the printed circuit board according to claim 1, wherein

the leg portions passed through said holder are dipped in a state that the leg portions are passed through holes formed at

the printed circuit board,

thereafter said holder main body portion is inclined forward and laid down on the printed circuit board in a manner that the flat surface is made in contact with an upper surface of the printed circuit board, and

said engagement nail portion is inserted into and engaged with an engagement hole formed at the printed circuit board to fix said holder to the printed circuit board.

3. The fixing holder for fixing the electronic component having the wire-shaped leg portions to the printed circuit board according to claim 1, wherein

a slanted surface is formed at a lower end portion of the flat surface so that, when said holder main body portion is inclined forward and laid down, the slanted surface contacts to the printed circuit board thereby to incline and lay said holder.

4. The fixing holder for fixing the electronic component having the wire-shaped leg portions to the printed circuit board according to claim 2, wherein

a slanted surface is formed at a lower end portion of the flat surface so that, when the holder main body portion is inclined forward and laid down, the slanted surface contacts to the printed circuit board thereby to incline and lay said holder.

5. The fixing holder for fixing the electronic component having

the wire-shaped leg portions to the printed circuit board according to claim 1, wherein

the opening is arranged in a manner that, when said holder main body portion is inclined forward, the wire-shaped leg portions move freely within the opening.

6. The fixing holder for fixing the electronic component having the wire-shaped leg portions to the printed circuit board according to claim 2, wherein

the opening is arranged in a manner that, when said holder main body portion is inclined forward, the wire-shaped leg portions move freely within the opening.

7. A method for fixing an electronic component having wire-shaped leg portions to a printed circuit board with a fixing holder,

said fixing holder being an almost cylindrical-shaped holder for holding the electronic component having the wire-shaped leg portions in a manner that the leg portions pass through and protrude therefrom,

said method comprising the steps of:

providing a fixing holder on a printed circuit board;

holding a main body portion of the electronic component by a holder main body portion of said fixing holder;

laying down said holder main body portion towards an opened surface of a base portion thereof; and

engaging an engagement nail portion formed on said main body portion of said fixing holder with the printed circuit board.

ABSTRACT OF THE DISCLOSURE

A fixing holder for fixing an electronic component having wire-shaped leg portions to a printed circuit board, the holder being an almost cylindrical-shaped holder for holding the electronic component having the wire-shaped leg portions in a manner that the leg portions pass through and protrude therefrom, the fixing holder comprises: a holder main body portion for holding a main body portion of the electronic component; and a base portion continuously provided to the holder main body portion, wherein one surface of the base portion on a forward side is opened to form an opening, at least a portion of periphery of the opening is configured to form a flat surface, and a side surface of the holder main body portion on a side where the opening is formed is protruded forward to form an engagement nail portion to be engaged with the printed circuit board.

~~整理番号=P02878~~ ~~特願平11-111877~~ ~~提出日 平成11年 4月20日~~ ~~頁: 1/ 2~~

~~【書類名】 図面~~

~~【図1】~~

2/2

1/3

Fig. 1A

~~(a)~~

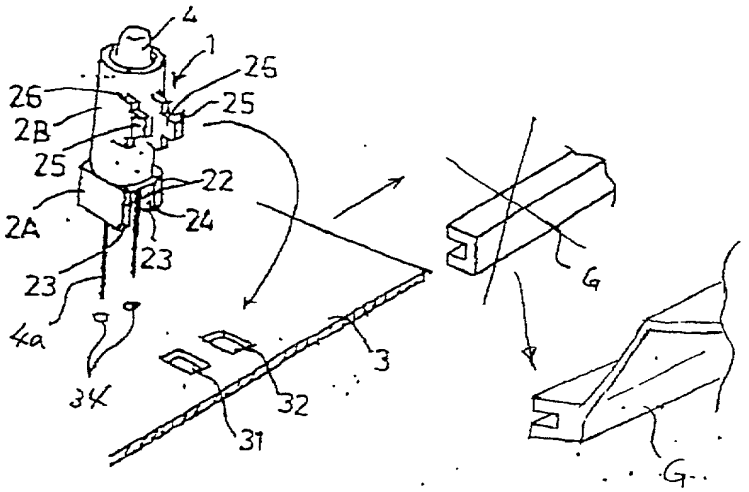
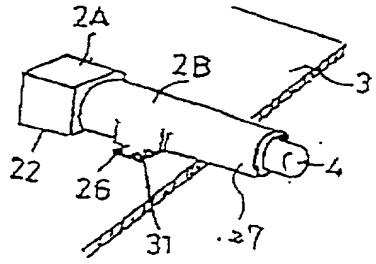


Fig. 1B

~~(b)~~



~~図2~~

2/3

Fig. 2A

~~(a)~~

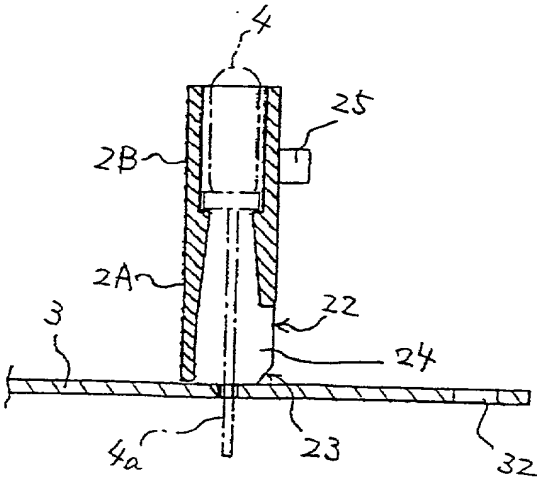
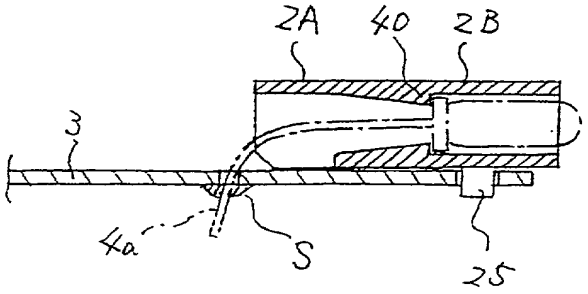


Fig. 2B

~~(b)~~



~~整理番号＝P02873~~ ~~特願平11-111877~~ ~~提出日 平成11年 4月20日~~ ~~頁 2/ 3~~

~~【図3】~~

3/3

Fig 3A

~~(a)~~

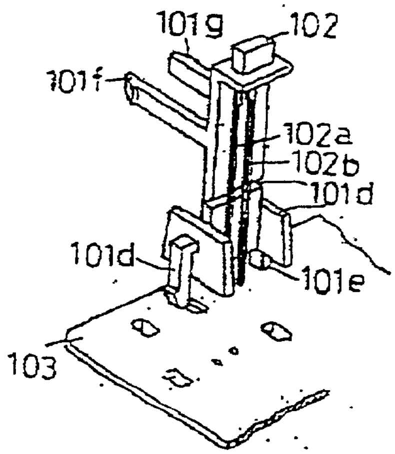


Fig 3B

~~(b)~~

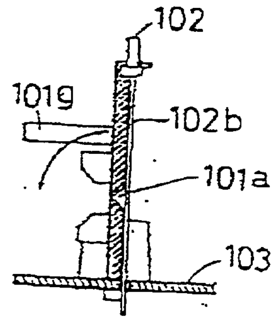
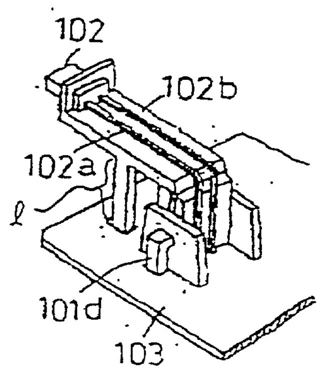


Fig 3C

~~(c)~~



Declaration and Power of Attorney For Patent Application

特許出願宣言書及び委任状

Japanese Language Declaration

日本語宣言書

下記の氏名の発明者として、私は以下の通り宣言します。

As a below named inventor, I hereby declare that:

私の住所、私書箱、国籍は下記の私の氏名の後に記載された通りです。

My residence, post office address and citizenship are as stated next to my name.

下記の名称の発明に関して請求範囲に記載され、特許出願している発明内容について、私が最初かつ唯一の発明者（下記の氏名が一つの場合）もしくは最初かつ共同発明者であると（下記の名称が複数の場合）信じています。

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

FIXING HOLDER FOR FIXING ELECTRONIC COMPONENT HAVING WIRE-SHAPED LEG PORTIONS TO PRINTED CIRCUIT BOARD, AND FIXING METHOD UTILIZING THE SAME

上記発明の明細書（下記の欄でx印がついていない場合は、本書に添付）は、

the specification of which is attached hereto unless the following box is checked:

☐ __月__日に提出され、米国出願番号または特許協定条約国際出願番号を_____とし、
（該当する場合）_____ に訂正されました。

☐ was filed on _____
as United States Application Number or
PCT International Application Number
_____ and was amended on
_____ (if applicable).

私は、特許請求範囲を含む上記訂正後の明細書を検討し、内容を理解していることをここに表明します。

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

私は、連邦規則法典第３７編第１条５６項に定義されるとおり、特許資格の有無について重要な情報を開示する義務があることを認めます。

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

Japanese Language Declaration
(日本語宣言書)

私は、米国法典第３５編１１９条(a)-(d)項又は３６５条(b)項に基き下記の、米国以外の国の少なくとも一ヵ国を指定している特許協力条約３６５(a)項に基ずく国際出願、又は外国での特許出願もしくは発明者証の出願についての外国優先権をここに主張するとともに、優先権を主張している、本出願の前に出願された特許または発明者証の外国出願を以下に、枠内をマークすることで、示しています。

I hereby claim foreign priority under Title 35, United States Code, Section 119 (a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s) 外国での先行出願			Priority Not Claimed 優先権主張なし
P. Hei. 11-111877	Japan	20/04/1999	☐
(Number) (番号)	(Country) (国名)	(Day/Month/Year Filed) (出願年月日)	
			☐
(Number) (番号)	(Country) (国名)	(Day/Month/Year Filed) (出願年月日)	

☐ 私は、第３５編米国法典１１９条(e)項に基いて下記の米国特許出願規定に記載された権利をここに主張いたします。

I hereby claim the benefit under Title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below.

(Application No.) (出願番号)	(Filing Date) (出願日)	(Application No.) (出願番号)	(Filing Date) (出願日)

私は、下記の米国法典第３５編１２０条に基いて下記の米国特許出願に記載された権利、又は米国を指定している特許協力条約３６５条(c)に基ずく権利をここに主張します。また、本出願の各請求範囲の内容が米国法典第３５編１１２条第１項又は特許協力条約で規定された方法で先行する米国特許出願に開示されていない限り、その先行米国出願書提出日以降で本出願書の日本国内または特許協力条約国際提出日までの期間中に入手された、連邦規則法典第３７編１条５６項で定義された特許資格の有無に関する重要な情報について開示義務があることを認識しています。

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s), or 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code Section 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of application.

(Application No.) (出願番号)	(Filing Date) (出願日)	(Status: Patented, Pending, Abandoned) (現況：特許許可済、係属中、放棄済)
(Application No.) (出願番号)	(Filing Date) (出願日)	(Status: Patented, Pending, Abandoned) (現況：特許許可済、係属中、放棄済)

私は、私自身の知識に基ずいて本宣言書中で私が行なう表明が真実であり、かつ私の入手した情報と私の信じるところに基ずく表明が全て真実であると信じていること、さらに故意になされた虚偽の表明及びそれと同等の行為は米国法典第１８編第１００１条に基ずき、罰金または拘禁、もしくはその両方により処罰されること、そしてそのような故意による虚偽の声明を行なえば、出願した、又は既に許可された特許の有効性が失われることを認識し、よってここに上記のごとく宣誓を致します。

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Japanese Language Declaration
(日本語宣言書)

委任状： 私は下記の発明者として、本出願に関する一切の手続きを米特許商標局に対して遂行する弁理士または代理人として、下記の者を指名いたします。（弁護士、または代理人の氏名及び登録番号を明記のこと）

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith

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第二共同発明者	Full name of second joint inventor, if any
第二共同発明者 日付	Second inventor's signature Date
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国籍	Citizenship
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